Bighorn Sheep
IN BRITISH COLUMBIA

Ecology, Conservation and Management

BRITISH COLUMBIA
Ministry of Environment, Lands and Parks

The Bighorn Sheep is remarkable for its adaptation to conditions ranging from the snow-capped alplands of the Canadian Rockies to the hot deserts of Death Valley.

INTRODUCTION

The Bighorn Sheep is remarkable for its ability to survive in conditions as diverse as the snow-capped alplands of the Canadian Rockies and the hot deserts of Death Valley and northern Mexico. Despite its scientific name, *Ovis canadensis*, the Bighorn Sheep is more widely distributed in the United States than in Canada. Recognizable by the massive curled horns of the adult rams and readily observed on many mountain rangelands, bighorns have long been a favourite subject of photographers and naturalists.

TAXONOMY

Order
Artiodactyla (Even-toed ungulates)

Family
Bovidae (Bison, Mountain Goat, Bighorn Sheep, Thinhorn Sheep)

Genus
Ovis

Species
canadensis

Subspecies
californiana (California Bighorn Sheep)
canadensis (Rocky Mountain Bighorn Sheep)

EVOLUTION AND APPEARANCE

Bighorn Sheep entered North America during the Pleistocene ice age by crossing the Bering land bridge from Siberia to Alaska when sea levels were lower than today. The oldest bighorn fossils in North America are about 100,000 years old. During the most recent, or Wisconsin, glaciation, bighorns survived south of the Cordilleran ice sheet in the western United States and northern Mexico. As the ice sheet melted 15,000 to 10,000 years ago, they gradually spread northward into southern British Columbia and Alberta.

The race or subspecies known as the California Bighorn *(Ovis canadensis californiana)* inhabits the southwest interior of British Columbia and extends southward on the east side of the Coast and Cascade ranges into northern California. Rocky Mountain Bighorns *(Ovis canadensis canadensis)* are found in the Canadian Rockies and southward along the main chain of the Rockies to New Mexico. California and Rocky Mountain bighorns look similar, but the California race is slightly darker in colour, and its rams have horns that flare outward more than those of Rocky Mountain rams.

Bighorns are appropriately named, adult rams being adorned with massive brown spiralled horns which curl back and down close to the head.

The bighorn's name comes from the adult ram's massive, brown, spiralled horns that curl back and down close to the head, with tips that project forward and outward just below the eyes. The horns continue to grow throughout the sheep's life, but growth slows down in winter. This causes check lines, or annuli, whose number shows the ram's age. Ram horns can be as long as 127 cm around the curve and as thick as 40 cm around the base. Rams often wear away (or broom) the first year or two's growth by fighting with other rams or rubbing their horns against rocks. Ewes have slightly curved horns about 30 cm long. Their annuli are too close together to tell their age beyond five or six years.

Bighorns are larger than domestic sheep.

IN BC, ROCKY MOUNTAIN BIGHORN SHEEP ARE DISCONTINUOUSLY DISTRIBUTED ALONG THE WESTERN SLOPES OF THE ROCKY MOUNTAINS.
Bill Swan

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Adult rams stand about 100 cm high at the shoulder and usually weigh 90 to 135 kg. Ewes are about two-thirds the size of rams. Yearling rams look a lot like ewes, but rams two years old or older have larger horns. Bighorns have concave hooves with rough foot pads that provide good traction on rocky terrain.

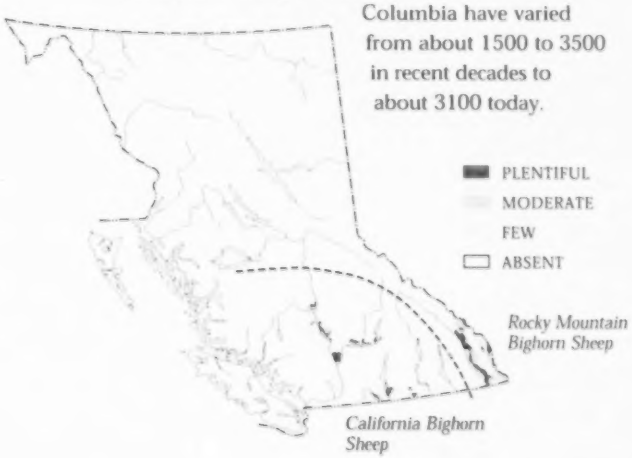
In late summer and autumn, Bighorn Sheep, particularly the rams, have a rich brown coat with a contrasting ivory-white rump patch, a white muzzle, and white trim on the back of all four legs. By late winter, the brown coat fades to a drab grey-brown. In British Columbia, bighorns usually shed their winter coat in June or July and look scruffy and bedraggled until the new coat grows in.

DISTRIBUTION AND ABUNDANCE

HOOF PRINTS

In British Columbia, California Bighorns occupy the dry valleys and mountains of the Okanagan, South Cariboo, and South Chilcotin regions. The unfavourably wet, heavily forested Selkirk and Purcell ranges separate the California Bighorns territory from the natural range of Rocky Mountain Bighorns. The main native herds of California Bighorns total about 3600 animals. They occur in the Okanagan area (Ashnola, Vaseaux Lake-Penticton Creek, Shorts Creek); along the east side of the Fraser River from about Lillooet to Williams Lake; west of the Fraser around Churn and Lone Cabin Creeks; in the Bridge River watershed; in the Taseko Lake-Chilko Lake area; and at the Junction of the Chilcotin and Fraser Rivers. California Bighorns have been introduced in a number of locations, including the Grand Forks area, Kamloops Lake, and Dog Creek.

Numbers of Rocky Mountain Bighorns in British Columbia have varied from about 1500 to 3500 in recent decades to about 3100 today.



In the East Kootenay region, Rocky Mountain Bighorn herds occur in five main locations: the Kootenay ranges along the east side of the Rocky Mountain Trench, from Radium south to Bull River; the Galton Range on the east side of the Trench from Elko to the Montana border; the Front ranges along the west side of the Elk River north of Sparwood; the west slope of the Rockies from Crowsnest Pass to Fording River; and the Kootenay River headwaters in the vicinity of Mount Assiniboine Park. More isolated herds also occur near Golden and in the Narroway and Belcourt drainages about 160 km north of McBride. New herds have been successfully established near Chase, Castlegar, and Spences Bridge, which are outside of the historic range of this subspecies, and animals from an introduction in Washington State have spread into the Salmo area.

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LIFE HISTORY

Bighorn Sheep are among the most social of British Columbia's hoofed mammals. They usually travel in groups of 5 to 20, occasionally up to 100. During most of the year, ewes and rams occupy separate ranges. Old ewes take charge of nursery groups consisting of related females of all ages, their lambs, and yearlings of both sexes. Young rams leave the bands of ewes when they are two to three years old and join bachelor groups. Young ewes and rams learn the location of seasonal ranges, salt licks, and escape terrain by associating with older, more experienced sheep.

Ram groups have well-developed social rules and a dominance hierarchy or "peck order" in which a ram's size, particularly the size of his horns, determines his position in the hierarchy. Smaller rams recognize and respect the dominance of bigger ones, but similar-sized rams engage in bouts of head-butting to settle who is the boss. This occurs throughout the year, but it is particularly pronounced among mature rams at breeding (rutting) time, when dominance usually confers the right to breed with any receptive ewes. However, smaller rams may mate with receptive ewes while the larger rams are busy fighting.

Most ewes do not breed until they are two years old, but where nutritional conditions are very good, a few may breed as yearlings. Rams are physiologically capable of breeding by two years of age, but they

Young animals learn the location of seasonal ranges, salt licks, and escape terrain by associating with older, more experienced sheep.

usually have to stay on the sidelines until they are seven or eight years old.

In southern British Columbia, Bighorn Sheep breed between early November and mid-December. Gestation lasts from 170 to 180 days, and lambs are born from the last week in April to early June. As lambing time nears, pregnant ewes leave their social group and isolate themselves in rugged lambing cliffs near the winter-spring range. They usually produce a single lamb that weighs 3 to 5 kg, but some well-nourished females produce occasional twins. After a few days of nursing and bonding in the cliffs, mother and lamb rejoin the ewes' social group. Bighorn lambs grow rapidly through their first summer and weigh about 30 kg by autumn. As summer progresses, lambs eat more plants and suckle less often. By about October they are weaned.

Bighorn Sheep die from predation, starvation, accidents, and disease. These factors kill about 50 percent of the lambs and 20 percent of yearling sheep each year. After the age of two, the sheep are less vulnerable, but the death rate increases again when they get old. If they don't die young, bighorns frequently live to 12 or 14 years; the maximum known age is 20 years.

Cougars and Coyotes are the primary predators of Bighorn Sheep in British Columbia. Cougars prey mostly on adult sheep while Coyotes usually take lambs or starving adults. On occasion, Cougars and Coyotes can seriously reduce the size of a herd.

In the East Kootenay region, the Rocky Mountain Bighorn Sheep herds that winter at low elevations contract pneumonia at about 20-year intervals. Pneumonia results in rapid die-offs that involve all ages and sexes and can reduce herds by 40 to 80 percent. Contact with domestic sheep and goats, deficiencies of key trace minerals, changes in diet, poor nutrition, overcrowding, and inclement weather appear to be factors in these die-offs. California Bighorn Sheep do not appear as susceptible to pneumonia epidemics.

DURING THE RUTTING PERIOD SIMILAR-SIZED RAMS ENGAGE IN BOUTS OF HEAD-BUTTING TO SETTLE WHO IS BOSS. *L.Tooze*

ECOLOGICAL RELATIONSHIPS

Bighorn Sheep are best suited physically and behaviourally to rugged, mostly treeless terrain, to foraging sites with low-growing grasses and herbs, and to regions with shallow snow cover. These requirements greatly restrict their distribution in British Columbia. Bighorns occur only where the climate is driest because those areas support natural grasslands and have the least snowfall.

Many California Bighorn Sheep spend the winter and spring on low-elevation grasslands in the Bunchgrass, Ponderosa Pine, and Interior Douglas-fir zones. These scattered sites, at elevations of from 300 to 1825 m, tend to be steep, south- to southwest-facing, and dominated by bluebunch wheatgrass. They consist of rugged breaks and terraces along river valleys, rocky outcrops, and grassland tracts surrounded by Douglas-fir forest. In recent years, most California Bighorns in the Fraser River area have spent the whole year on these low elevation habitats. Some of these non-migratory sheep are attracted to alfalfa fields, but many simply remain on natural winter ranges all year. This nonmigratory behaviour has increased the probability of heavy lungworm infections.

Most migratory bighorns in British Columbia leave their winter ranges in May or June and migrate to summer pastures in the alpine zone.

Most Rocky Mountain Bighorn Sheep winter on low-elevation bunchgrass ranges, but a few isolated herds, mostly in the Elk River area, spend the winter on windblown alpine ridges. Wildfires have created many of the low-elevation East Kootenay winter-spring ranges, and these would disappear without recurring fires.

Most migratory bighorns leave their winter ranges in May or June and move to summer pastures in the Alpine Zone. This may involve moving higher on the same mountain, or travelling miles through forested terrain to distant alpine ranges. Bighorns return to their winter ranges in late September or October when snow covers their alpine forage. By moving up to higher elevations in early spring, bighorns can graze on plants in their most nutritious early growth stages and get into the best possible condition for the rigours of winter.

Cured grasses such as fescue and bluebunch wheatgrass are key forage species on most winter ranges in British Columbia. Junegrass and the half-shrub pasture sage are also important, especially in early spring. When sheep use conifers such as Douglas-fir as winter forage, it indicates that preferred forage is scarce. In late spring, Bighorn Sheep relish the new growth of a variety of grasses, together with herbs like balsamroot. On alpine summer ranges, they eat a variety of grasses and sedges, together with succulent herbs such as lupines and the tender new leaves of willows and other low shrubs.

Bighorn Sheep share their winter-spring ranges with other herbivores, both wild and domestic. Because Mountain Goats prefer steeper and rockier terrain and deer eat mostly woody browse, they are not significant competitors. But in the East Kootenay area, Elk are abundant on some winter ranges and may compete with bighorns for forage. Domestic sheep no longer graze on bighorn ranges in British Columbia, but cattle grazing has had a serious impact on a number of winter-spring ranges and is still a problem in some areas.

Cattle grazing has had a serious impact on some winter-spring ranges, and continues to be a problem in local areas.

VALUES AND USES

Before European settlement, native people didn't have many uses for wild sheep, but some bands used them if salmon were not available. In the Similkameen region, for example, the local Salishan people hosted early-winter hunts in which people from neighbouring bands joined in to help drive the sheep toward the waiting hunters. These people relished bighorn meat, and they used the hides for clothing and the horns and bones for a variety of utensils, implements, and ceremonial objects.

In recent decades, bighorn hunting in British Columbia has mostly been restricted to rams with three-quarter or full-curl horns. These carefully controlled hunts remove a limited number of animals and provide revenue to guide-outfitters and other suppliers. Some areas control the wild sheep population by offering limited-entry hunts for all rams, ewes, and lambs.

Viewing bighorns is becoming an increasingly popular outdoor activity in British Columbia. Few wildlife spectacles can match the sight of these majestic, social animals grazing and interacting on

BIGHORN SHEEP ARE CONSIDERED VULNERABLE AND "AT RISK" IN BRITISH COLUMBIA. *Bill Swan*

pristine mountain range lands. Bighorn Sheep become relatively tame when no one is hunting or harassing them, and there are several places where it is possible to see and appreciate these unique survivors of the ice-age. The Junction Sheep Range Provincial Park and the nearby Farwell Canyon west of Williams Lake, near Pavillion, and near Big Bar Creek are good places to see the Fraser River herds of California Bighorns. There are even better opportunities along the north side of Kamloops Lake and along the north side of the South Thompson River east of Kamloops. In the Okanagan Valley, California Bighorns are often visible along mountain slopes beside Vaseux Lake, and it is often possible to see the introduced herd of California Bighorns from Highway 33 just east of Grand Forks. Spring and fall are the most likely times to see sheep in those areas.

Rocky Mountain Bighorns are frequently visible on winter-spring ranges near Elko, Bull River, Premier Ridge, Columbia Lake, and Radium Hotsprings. People travelling along the Trans Canada Highway near Spences Bridge and Chase often see the introduced herds of Rocky Mountain Bighorns.

CONSERVATION CONCERNS

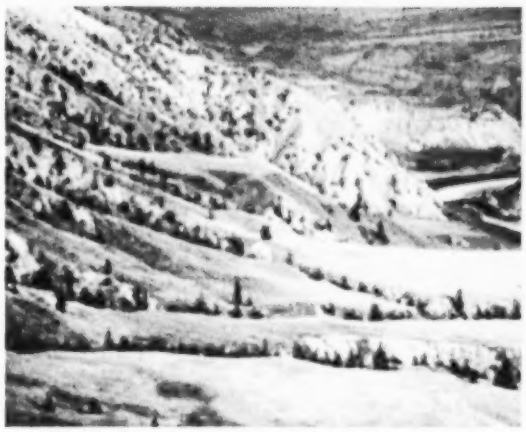
During the late 1800s, overhunting decimated many Bighorn Sheep herds in British Columbia. In that era of few regulations and virtually no enforcement, many sport-hunting parties came from abroad, and local market hunters supplied mining and construction camps with game

meat. Next came a period of settlement, fencing, heavy grazing on many winter ranges, and competition from domestic sheep on summer ranges, bighorns also contracted several diseases and parasites from domestic sheep. As a result, bighorn populations were at a low ebb in the early 1900s. From about 1910 to 1950 when bighorn hunting was closed or very restricted, herds increased again, but ranchers continued to settle winter ranges and graze their livestock there. By the 1950s, sheep populations had recovered to some extent, but many ranges were in poor condition and trees were invading others as a result of forest fire control. The severe East Kootenay bighorn die-off in 1965 was a stark reminder of the need to protect and improve wild sheep habitat.

In the 1970s, government agencies initiated the first significant habitat management programs, with the support of sport-hunting groups. These programs acquired critical winter ranges in the Ashnola, Vaseux, Chilcotin River, Premier Ridge, and Bull River areas. In the 1980s and 1990s, additional bighorn habitats received protection, so that many of the key winter ranges are now reserved and managed for the benefit of wild sheep. Although some important bighorn ranges are still privately owned, bighorns have increased as a result of government intervention.

B.C. has played an important role in the international conservation of Bighorn Sheep. In the 1950s and 1960s, California Bighorns from British Columbia's Junction herd helped reestablish this subspecies in Washington and Oregon. During the 1990s, California Bighorns from the Fraser River and Kamloops herds were moved to Nevada, Washington, North Dakota, and Utah, and Rocky Mountain Bighorns from Spences Bridge were sent to Washington, Idaho, and Oregon. Those introductions flourished and have provided animals to restock still other ranges. This is a major wildlife conservation success story.

Both California and Rocky Mountain Bighorns are considered vulnerable and "at risk" in British Columbia, which means that without further protection, they are likely to become either threatened or endangered. Today, a major concern is fragmentation of habitat. Dealing with this concern and ensuring the long-term viability of Bighorn Sheep will require expanding protected areas, particularly wildlife management areas, and preserving corridors between habitats. In addition, restoring winter ranges will require an aggressive program of prescribed burning and improved livestock grazing practices. Finally, to prevent wild sheep from becoming diseased, it will be necessary to keep domestic sheep away from areas where wild sheep graze.



CALIFORNIA BIGHORN SHEEP ARE COMMONLY FOUND IN AREAS WITH LARGE EXPANSES OF OPEN SOUTHERLY AND WESTERN FACING GRASSLAND SLOPES, PARKLAND FORESTS AND STEEP VALLEY WALLS. *J. Youds*

Settlement has permanently destroyed some of British Columbia's Bighorn Sheep habitat, but herds appear to be doing well today. Although it may not be possible to increase their numbers or distribution significantly, we need to expand our conservation efforts in order to protect these unique and vulnerable animals.

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PROJECT COORDINATION: IAN HATTER, GAIL HARCOMBE, LIZ STANLAKE, ARLENE BETHUNE
ORIGINAL TEXT: DONALD A. BLOOD
ARTWORK: MICHAEL HAMES
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